CLAIMS:

1. A method for producing high purity tantalum comprising the steps of:
purifying K_2TaF_7 by a dissolution process;
reacting purified K_2TaF_7 with a reducing agent to produce tantalum powder; and
reacting said tantalum powder with iodine in a container.

2. A method according to claim 1, wherein HF or a mixture of HF and H_2SO_4 is used in the dissolution of K_2TaF_7.

3. A method according to claim 1, wherein a solution containing KCl is used to precipitate said K_2TaF_7 from the solution.

4. A method according to claim 1, wherein Nb and other metallic impurities in said K_2TaF_7 are reduced to levels lower than about 20 ppm, by weight.

5. A method according to claim 1, wherein W and Mo in said K_2TaF_7 are reduced to less than about 1 ppm, by weight.

6. A method according to claim 1, wherein said reducing agent is sodium.

7. A method according to claim 1, wherein said container has a reactant-contacting surface comprising a metal more electrochemically noble than tantalum according to the chloride electromotive series.

8. A method according to claim 7, wherein said reactant-contacting surface comprises molybdenum, tungsten or an alloy of molybdenum and tungsten.

9. A method according to claim 1, further comprising electron beam melting said tantalum to produce a high purity tantalum ingot.

10. A method for producing high purity tantalum comprising reacting impure tantalum with iodine gas in a container and decomposing tantalum iodides on a filament.

11. A method according to claim 10 wherein said container has a reactant-contacting surface comprising a metal more electrochemically noble than tantalum according to the chloride electromotive series.

12. A method according to claim 11 wherein said reactant-contacting surface comprises molybdenum, tungsten or an alloy of molybdenum and tungsten.

13. A method according to claim 10 wherein said filament comprises tantalum.

14. A method according to claim 10 further comprising electron-beam melting said tantalum to form a high-purity tantalum ingot.

15. High purity tantalum comprising tantalum and less than about 500 ppm, by weight, total metallic impurities.

16. High purity tantalum comprising less than about 50 ppm, by weight, tungsten or molybdenum.

17. High purity tantalum comprising less than about 20 ppm, by weight, tungsten or molybdenum.

18. High purity tantalum comprising less than about 5 ppm, by weight, each of tungsten and molybdenum.

19. High purity tantalum comprising less than 20 ppm, by weight, total of niobium, molybdenum and tungsten.

20. High purity tantalum comprising tantalum and less than 5 ppm, by weight, total of niobium, molybdenum and tungsten.

21. A sputtering target comprising high purity titanium according to claim 15.

22. A sputtering target comprising high purity titanium according to claim 16.

23. A sputtering target comprising high purity titanium according to claim 17.

24. A sputtering target comprising high purity titanium according to claim 18.

25. A sputtering target comprising high purity titanium according to claim 19.

26. A thin film produced by a sputtering target according to claim 15.

27. A thin film produced by a sputtering target according to claim 16.

28. A thin film produced by a sputtering target according to claim 17.

29. A thin film produced by a sputtering target according to claim 18.

30. A thin film produced by a sputtering target according to claim 19.